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PHIL 303

9 December 2024

The Meaning of Scientific Theories

Scientific theories allow us to make predictions, understand natural phenomena, and advance humanity from generation to generation. George Berkeley states that the value of inquiry is "to make very probable conjectures, touching things that may have happened…[or] to predict things to come" (Berkeley 70). In other words, the essence of scientific theories is the predictions they make. I disagree with this and believe that the value of these theories is they can be used to explain how the world works, solve real-life problems, and drive technological advancements that enhance human life and progress.

In addition to making predictions, scientific theories also help us understand how the world works. This means that we don't just predict what can happen, but also why that thing happened. For instance, Newton's theory of gravity doesn't just predict that an object will fall to the ground, but also helps us understand the underlying force at play that causes objects to fall to the ground. This idea is crucial to the advancement of science because it also allows us to question theories and iterate upon them. For example, early astronomers believed that the Earth was in the center of the universe. In this case, observations supported this belief that seemed to predict the motion of planets in space. As new evidence was discovered, the Sun was found to be the center of the universe and while this made predictions about the movement of different planets, it also provided a better explanation and underlying cause for this theory.[1] This shows that the cause of scientific phenomena is also valuable, in addition to the power of prediction.

[1] Conversation with Balla, a friend

However, Berkeley focuses on the observational and predictive nature of scientific inquiry, as he writes, “by a diligent observation of the phenomena within our view, we may discover the general laws of Nature, and from them deduce the other phenomena” (Berkeley 71). This focus on predictions, while important, does not capture the full essence of scientific discovery.

Scientific theories are also able to be applied to solve real-world problems. This is exemplified by how problems in fields such as medicine and environmental science have been solved/are being solved. For instance, we haven’t just used the germ theory of disease to predict that germs cause sickness, but we’ve also been able to understand how this happens which has led to the development of vaccines, antibiotics, medicines, and sanitation protocols that have saved millions of lives all across the world. Additionally, climate science doesn’t just predict that our planet is going to get warmer over time but also explains why and how this happens, and because of this policymakers, governments, entrepreneurs, and organizations are all building solutions to prevent this from happening[2]. While Berkeley believes that the value of theories is in the ability to predict, solving real-world problems requires more than just prediction; it also requires the understanding of complex phenomena.

Finally, scientific theories have been the driving force behind technological advancements that have significantly improved the quality of life for humanity as a whole. In today’s day and age, many of us depend on phones and computers to stay connected with family, complete our work, and be entertained. These devices are powered by semiconductors and chips that originated out of the highly-theoretical field of Quantum Mechanics. There’s obviously value for this field in terms of making predictions about how, say, particles behave but there’s also tremendous value in creating computing devices that shape the lives of billions around the world. Another example is the Global Positioning System, or GPS, which requires hyper-precise

[2] Conversation with Marb, a friend

measurements of time and space that originate from Einstein's Theory of Relativity.[3] These examples show that scientific theories also exercise an impact on humanity rather than just predicting natural phenomena.

However, predictions enable scientific theories to gain widespread acceptance and lead to real-world implications. For instance, the heliocentric theory gained acceptance because it made correct predictions about the movement of planets, demonstrating the theory's value in its predictive power. Thus, the value of a theory is primarily determined by how well it can predict future events, rather than how it works or its direct application.

This is an oversimplification of the meaning of scientific inquiry. Though predictions are very important, they only encompass one part of the value of theory. As mentioned before, the germ theory of disease was valuable not because it allowed us to prove and see how diseases spread, but because we could develop ways to combat this in the form of medicines, vaccines, and sanitation mechanisms that have helped humans all across the world. This shows that the essence of scientific theories is not just rooted in prediction, but also what these predictions enable us to do.

Additionally, theories that aim to explain the "why" behind the reason something can often be theoretical and very incorrect. For instance, before atoms were actually observable and we could make concrete predictions about them, theories about atoms were very speculative. Also, planetary motion in the time of philosophers such as Aristotle and Ptolemy was also not rooted in firm evidence and was also disproven time and time again. Berkeley acknowledges that scientific inquiry is a process of discovering the "general laws of nature" from observations, which can obviously change over time (Berkeley 93). This shows that explanations can be less trustworthy than predictions.

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[3] Conversation with Johns, a friend

This iterative process of explanations being proven wrong and then being right is actually not a weakness but a strength of the scientific method. While these theories can be less reliable than predictions, they provide a foundation to iterate upon and eventually come up with more reliable theories that can be applied to our everyday life. The field of Quantum Mechanics began as a theoretical and speculative field about the behavior of atoms, but has now produced revolutionary technologies like semiconductors that shape modern life.

It can also be argued that for scientific applications, predictions matter more than understanding. For instance, for engineers that need to build bridges, they only need to be able to predict how much weight can the bridge hold instead of understanding why the bridge behaves as it does at a quantum or atomic level.[4] However, understanding of complex scientific principles is also key to practical applications. GPS technologies rose from Einstein's Theory of Relativity, showing that scientific understanding allows for breakthroughs that can transform humanity for the greater good.

Scientific theories are much more than just ways of predicting things. They also allow us to explain how the world works, solve real-life problems, and create breakthrough innovations that drive humanity forward. Though predictions are important, the essence of scientific inquiry is in understanding how the universe works. While this doesn't immediately lead to world-changing outcomes, it leads to eventual progress and innovation. From developing life-saving medical treatments to creating technologies that connect billions, scientific theories are instrumental in human progress. As we continue understanding how the universe works, we must also understand that scientific theories are the lens through which we understand, interact with, and ultimately shape our world.

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[4] Conversation with Rafi, a friend

Works Cited

Berkeley, David, and Howard Robinson. *Principles of Human Knowledge and Three Dialogues*. Oxford, 1996.